

Applicant : Nobuyuki Sugimura et al.
For : ACCUMULATOR USING INTERNAL AND EXTERNAL THREADS
Page : 3

In the Specification:

Please replace paragraph [0003] with the following amended paragraph:

When an inner pressure in this accumulator increases, the closure member is pressed outward, so that an axial and circumferential load, namely, a so-called fluctuating load-load, is imparted to the thread repeatedly in the range of zero to a maximum level. This load is not borne uniformly by each ridge-ridge, but one-sided greatly in the tensile direction. Therefore, stress concentration occurs in a bottom of a valley of a base end portion of the internal thread which receives a large tensile load, so that the internal thread is broken from this portion thereof.

Please replace paragraph [0007] with the following amended paragraph:

When an inner pressure increases in an accumulator using this buttress internal thread, a closure member is raised, and an external thread comes into pressure contact with a pressure flank of the internal thread to raise the same. This raising force exerted on the pressure flank is dispersed, and generates a force for expanding a container main body-outward, this outward. This is a so-called diameter expansion force.

Please replace paragraph [0008] with the following amended paragraph:

This diameter expansion force becomes small when the angle of inclination of the pressure flank is small. For example, when the angle of inclination is 7°, the diameter expansion force becomes about 1/5 as compared with a case where the angle of inclination is 30°. Therefore, since the diameter of the top end portion of the container main body does not substantially expand, a load of the external thread imparted to a ridge of the internal thread cannot be made to escape to a ridge of a subsequent internal thread, and then the internal thread is broken. Especially, a large load is imparted to the first to third ridges of the internal thread on the side of the base end thereof, and specially especially, a large tensile stress occur occurs in a bottom of a valley of the internal thread, so that the internal thread tends to be broken from this portion thereof in most cases. Accordingly, this causes the lifetime of the accumulator to be shortened. The present invention aims at improving the lifetime of an

Applicant : Nobuyuki Sugimura et al.
For : ACCUMULATOR USING INTERNAL AND EXTERNAL THREADS
Page : 4

accumulator in view of the above-described circumstances. Another object of the present invention is to prevent the breakage of an internal thread.

Please replace paragraph [0011] with the following amended paragraph:

Fig. 1 to Fig. 4 are drawings showing a first embodiment of the present invention, in which Fig. 1 is an enlarged view of a principal portion of what is shown in Fig. 3, Fig. 3. Fig. 2 is a longitudinal sectional view showing the condition of a reverse-butress internal thread of Fig. 1 which is receiving a load, load. Fig. 3 is an enlarged sectional view of a principal portion of what is shown in Fig. 4, and Fig. 4. Fig. 4 is a longitudinal sectional view showing an accumulator. Fig. 5 is an enlarged longitudinal sectional view showing a second embodiment of the present invention, Fig. 6 invention. Fig. 6 is an enlarged longitudinal sectional view showing a third embodiment of the present invention, Fig. 7 invention. Fig. 7 is an enlarged longitudinal sectional view showing a fourth embodiment of the present invention, and Fig. 8 invention. Fig. 8 to Fig. 10 drawings showing show a fifth embodiment of the present invention, in which Fig. 8 is an enlarged view of a principal portion of what is shown in Fig. 10, Fig. 10. Fig. 9 is a longitudinal sectional view showing the condition of the internal thread of Fig. 8 which is receiving a load, and load. Fig. 10 is an enlarged longitudinal sectional view showing a screwed portion of a container main body of the accumulator and a closure member.

Please replace paragraph [0016] with the following amended paragraph:

The reverse pressure flank 20A and reverse clearance flank 32B continue 20B are connected to each other via a bottom 20C of a valley of the internal thread, a thread. A radius r_1 of this bottom 20C of the valley is set to 0.4 mm. The radius r_1 of the bottom of the valley of the internal thread is selected suitably as necessary, and a preferable range of the radius r_1 is 1/10 to 1/3 of the pitch of the thread.

Please replace paragraph [0020] with the following amended paragraph:

At this time, a load imparted to the internal thread ridge F1 is dispersed to cause a

Applicant : Nobuyuki Sugimura et al.
For : ACCUMULATOR USING INTERNAL AND EXTERNAL THREADS
Page : 5

pressing force in the direction of an arrow A20, i.e., a diameter expansion force to occur. Therefore, the reverse pressure flank 20A is elastically deformed as the flank 20A slides on a side surface of the ridge M1 of the external thread 21, and the flank 20A thereby expands outward. The angle of inclination β of this reverse pressure flank 20A is 45° and as is three times as large as that of 15° of a pressure flank of a prior art internal thread, thread so that a circumferential displacement increases greatly. The portion of a load which cannot be borne by the internal thread ridge F1 is made to escape, and imparted to a subsequent internal thread ridge F2. The portion of the load which cannot be borne by the internal thread ridge F2 is also made to escape, and imparted to a subsequent internal thread ridge F3. Such processes are repeated one after another, and a total load imparted to the external thread is transmitted to internal thread ridges F1 and then to F12.

Please replace paragraph [0024] with the following amended paragraph:

The differences between this embodiment and the first embodiment (Fig. 1 to Fig. 4) reside in that the angle β of inclination of a reverse pressure flank 20A of a reverse-butress internal thread is 50° ; the angle β angle θ of inclination of a reverse clearance flank 20B is 10° ; and the radius r_l of a bottom of a valley of the internal thread 20C is 0.21 mm.

Please replace paragraph [0028] with the following amended paragraph:

When a buttress internal thread is in a standard arrangement condition, in which, for example, a free end thereof is positioned on the upper side with a base end thereof positioned on the lower side, and, in which a flank (load receiving surface) of a smaller angle of inclination is positioned as a surface on the lower side of the internal thread ridge with a flank of a larger angle of inclination positioned as a surface on the upper side thereof, is set in a reversely arranged state in which, for example, the upper and lower portions of the buttress internal thread are reversed, and, in which the free end thereof is positioned on the lower side with the base end thereof positioned on the upper side, the flank of a larger angle of inclination becomes a load-receiving reverse pressure flank with the flank of smaller angle of inclination becoming a reverse clearance flank. In this manner, the buttress internal thread may be

Applicant : Nobuyuki Sugimura et al.
For : ACCUMULATOR USING INTERNAL AND EXTERNAL THREADS
Page : 6

formed to a reverse-butress internal thread by setting the buttress internal thread in a reversed state.

Please replace paragraph [0040] with the following amended paragraph:

The following became clear from what ~~were~~ is shown in this Table 1.

Please replace paragraph [0047] with the following amended paragraph:

The following ~~were clarified~~ became clear from what ~~were~~ is shown in this Table 2.

Please replace paragraph [0054] with the following amended paragraph:

This internal thread is an internal thread having an included angle of 90 degrees. The included angle δ is 90 degrees, and larger than that of a standard triangular thread, for example, an ISO standard triangular thread (ISO 261). An angle δ of inclination of a pressure flank $20a$ 20A thereof and that γ of a clearance flank $20b$ 20B are formed to have an equal level of 45 degrees. Since these two flanks $20a$ and $20b$ 20A and 20B have an equal angle α , γ , the flanks become symmetric, this internal thread can be cut easily as compared with a reverse-butress internal thread. Namely, it is not necessary to prepare a cutting tool of a special shape, and a cutting process can be carried out efficiently.

Please replace paragraph [0055] with the following amended paragraph:

Incidentally, though the angles α , γ of inclination of the flanks $20a$, $20b$ 20A, 20B are formed to be equal to each other, the included angle δ may not necessarily be set to 90 degrees accurately. The included angle includes angles in the neighborhood of 90 degrees. Namely, the included angle δ is set suitably and selectively to 90 degrees or to a level in the range of substantially 90 degrees. For example, the angles α , γ may be set to 44.5 degrees respectively, and the included angle δ to 89 degrees.

Please replace paragraph [0056] with the following amended paragraph:

The pressure flank $20a$ 20A and clearance flank $32b$ 20B continue to each other via a

Applicant : Nobuyuki Sugimura et al.
For : ACCUMULATOR USING INTERNAL AND EXTERNAL THREADS
Page : 7

bottom $20e$ $20C$ of an internal thread valley, and the radius r_1 of this bottom $20e$ $20C$ of the valley is set to 0.4 mm. The radius r_1 of the bottom of the thread valley is set suitably and selectively as necessary, and preferably in the range of 1/10 to 1/3 of the pitch of the thread.

Please replace paragraph [0059] with the following amended paragraph:

The accumulator Acc is connected to a hydraulic circuit (not shown) via the supply/discharge tube 13. When a liquid pressure in the hydraulic circuit varies to cause the pressure in the container main body to increase, the closure member 5 is pressed in the direction of an arrow A5, and the external thread ridge M1 of the external thread 21 is thereby brought into pressure contact with the pressure flank $20a$ $20A$ of the internal thread 20 as shown in Fig. 9

Please replace paragraph [0060] with the following amended paragraph:

A load imparted to the internal thread ridge F1 is dispersed to cause a pressing force in the direction of an arrow A20, i.e., a diameter expansion force to occur. Therefore, the pressure flank $20a$ $20A$ is elastically deformed as the pressure flank $20a$ $20A$ slides on a side surface of an external thread ridge M1 of the external thread 21, the pressure flank $20a$ $20A$ thereby expanding outward.

Please replace paragraph [0061] with the following amended paragraph:

During this time, since the angle α of inclination of the pressure flank $20a$ $20A$ of the internal thread is 45° , which is 1.5 times as large as that (i.e., 30°) of the pressure flank of a prior art standard triangular thread, a circumferential displacement greatly increases.

Please replace paragraph [0062] with the following amended paragraph:

Also, the angles α , γ of inclination of the two flanks $20a$, $20b$ $20A$, $20B$ of the internal thread are 45 degrees respectively, and the included angle δ is 90 degrees, the degrees. The thickness of a root portion and the strength of the internal thread increase increases as compared with those of a standard triangular thread.

Applicant : Nobuyuki Sugimura et al.
For : ACCUMULATOR USING INTERNAL AND EXTERNAL THREADS
Page : 8

Please replace paragraph [0066] with the following amended paragraph:

Since the accumulator according to the present invention is provided with a reverse-butress internal thread in which a clearance flank and a pressure flank of a buttress internal thread are reversed, or provided with an internal thread having an included angle of 90 degrees in which the angles of inclination of the two flanks are equal to each other, the angle of inclination of a load receiving surface increases greatly. Therefore, the diameter expansion force is increased in comparison with the prior art examples, and, thereby, a load borne by the thread ridges is lessened. This prevents the breakage of the internal thread, and the lifetime of the accumulator can be improved.